

Initial Results from a Survey of Iowa Corn Ethanol Plants

A.S. Leaflet R2862

Bailey Richardson, Research Assistant, Agricultural and Biosystems Engineering Department;
Russ M. Euken, Field Specialist, Agriculture and Natural Resources Extension and Outreach;
Kurt A. Rosentrater, Assistant Professor, Agricultural and Biosystems Engineering Department

Summary and Implications

A survey of Iowa ethanol plants was conducted to understand the production of animal feed coproducts from ethanol processing. Of interest is which coproducts are being produced, how the coproducts are being produced, coproduct composition, facility utility information, and challenges associated with coproduct manufacture. Specifically, the intent was to understand oil removal from distillers coproducts, and the impact of those processes on the concentration of oil in the distillers coproducts. We did not intend to determine variation in coproducts plant to plant or within a given plant over time.

Introduction

As the ethanol industry has matured, individual plants have implemented new production processes which can increase their efficiencies, diversify their coproduct streams, and improve their profit margins. For example, many plants now sell large proportions of wet cake or modified distillers wet grains and DDGS to local livestock producers. Furthermore, many plants are now producing fractionated products, including several types of high-protein DDG and DDGS. During the last few years many plants have also installed centrifuges to remove corn oil from the stillage streams (which is then sold for biodiesel manufacturing), and results in low-fat DDGS. This has resulted in more types of distillers grains being available in the market. Removing oil from the distillers removes a source of energy for animals. In swine and poultry, lower oil distillers has been shown to affect performance of animals fed the lower oil distillers. In beef, limited research has not shown an effect in animal performance with moderately-reduced oil levels. Understanding what is available in Iowa, how coproducts are produced, and the nutrient concentration of those coproducts will benefit livestock producers and help them to make informed decisions about utilizing distillers coproducts in diets.

Materials and Methods

The state currently has 39 operational corn-based ethanol plants (Figure 1). After receiving approval by the ISU Institutional Review Board, each of these plants was contacted by phone and then sent a hardcopy questionnaire

which consisted of 24 questions which inquired about multiple aspects of ethanol and coproduct production. In addition, samples of distillers coproducts were obtained directly from ethanol plants or through livestock producers utilizing coproducts. Samples were analyzed at Dairyland Labs utilizing the NIR distillers grains analysis.

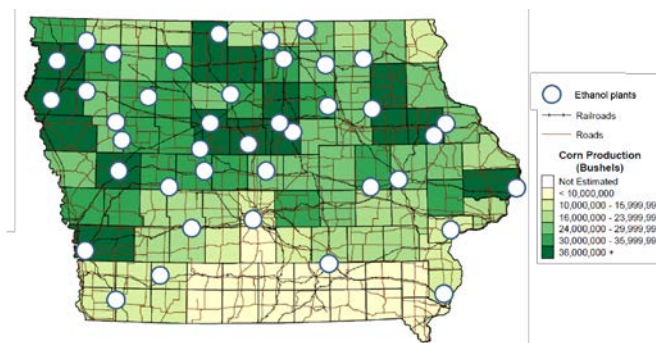


Figure 1. Iowa ethanol plants in 2013 (based upon <http://www.nass.usda.gov>).

Results and Discussion

Out of the 39 ethanol plants which were contacted, 10 complete surveys were returned (a 25.6% response rate was achieved). Preliminary analysis revealed several trends:

- 78% of respondents were removing corn oil from their distillers coproducts.
- Of those plants which were removing corn oil, 100% of them were using centrifugation.
- 71% were using an emulsifier to assist oil removal.
- Respondents reported that oil removal was very consistent over time.
- These companies were not selling reduced fat distillers grains to different markets than traditional distillers grains.
- 83% of respondents indicated that reduced fat distillers grains were not sold at a different price compared to traditional distillers grains.
- Oil was sold for both the biodiesel market as well as animal feeds.
- Most plants produced DDGS, CDS, and modified DWG (Figure 2).
- There are vast differences in plant scales; smaller plants produced coproducts at about 100 tons/month, while the large plants produce more than 100,000 tons/month (Figure 3).
- The survey responses indicated DDGS was generally 87 to 90% dry solids content (Figure 4); modified DWG ranged from 45-60% solids; CDS (syrup) ranged from 25-55% solids.

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- Survey responses indicated oil of DDGS ranged from 7-9.5%, DWG ranged from 4-8% (Figure 5).

In addition, 18 random samples of coproducts (6 dry, 3 wet, and 9 modified) were obtained from plants or livestock producers and analyzed. Samples were from different plants but did not represent all plants in Iowa. The majority of plants that responded to the survey were also represented in the analyzed samples. The dry matter (solids %) is shown in Figure 6; protein and oil content of those samples are shown in Figure 7. Oil content of the samples ranged from 6.7 up to 10.4 %, and averaged 8.54% oil for MWDG and 8.42% oil for DDGS. A summary distillers grains analyzed at

Dairyland Labs in 2010 showed that oil of 532 DDGS samples ranged from 7.6% to 12.48%, and averaged 10.04%, while oil content of 561 samples of MWDG had a range of 6.03% to 13.91%, and averaged 9.97%.

Acknowledgments

We gratefully acknowledge funding from the Iowa Beef Center, support from Iowa State University, and the plant representatives who responded to the survey.

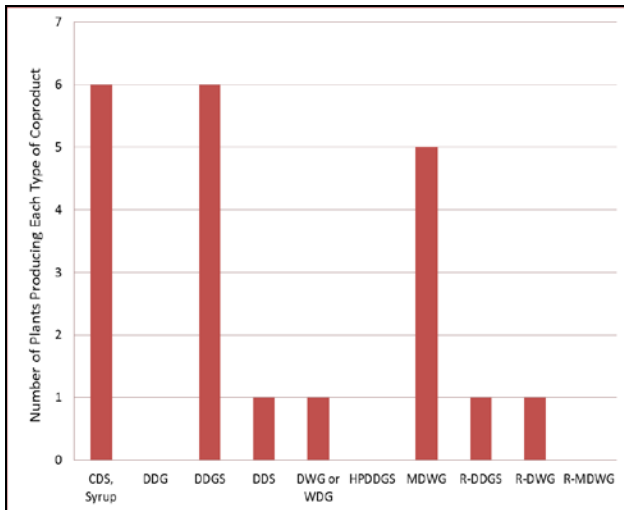


Figure 2. Production of coproducts in Iowa according to the 10 responding plants.

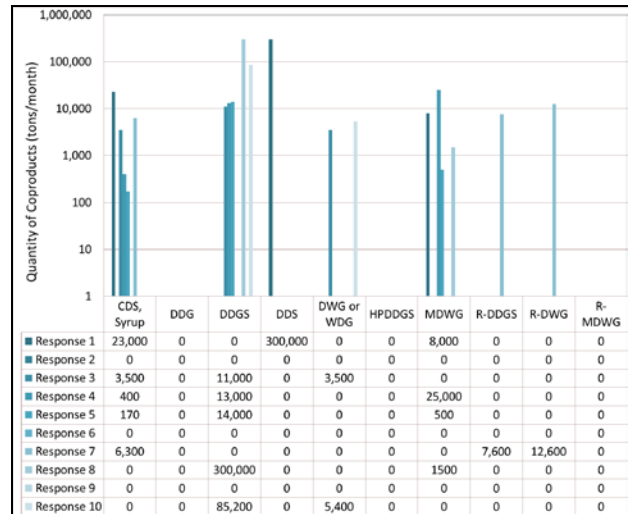


Figure 3. Quantity (tons/month) of coproducts in Iowa at the 10 responding plants.

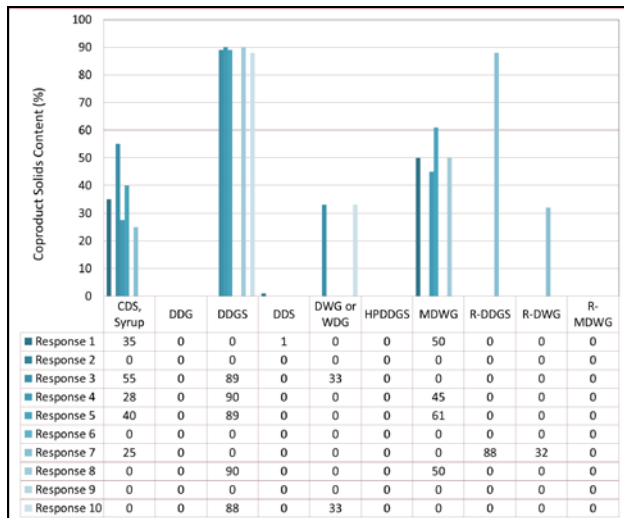


Figure 4. Stated solids content (%) of coproducts at the 10 responding plants.

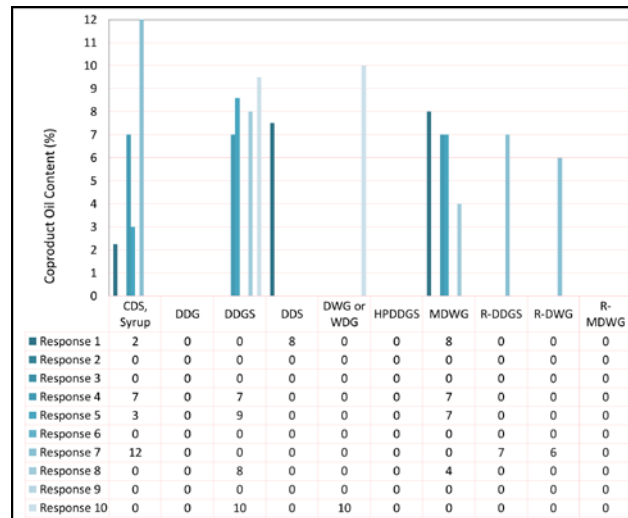


Figure 5. Stated oil content (%) of coproducts at the 10 responding plants.

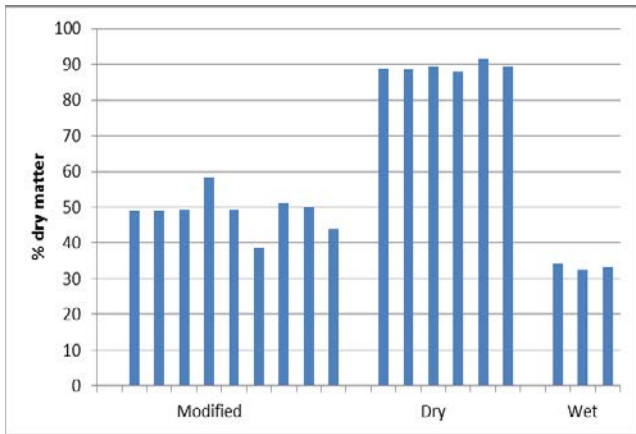


Figure 6. Dry matter (%) of analyzed samples.

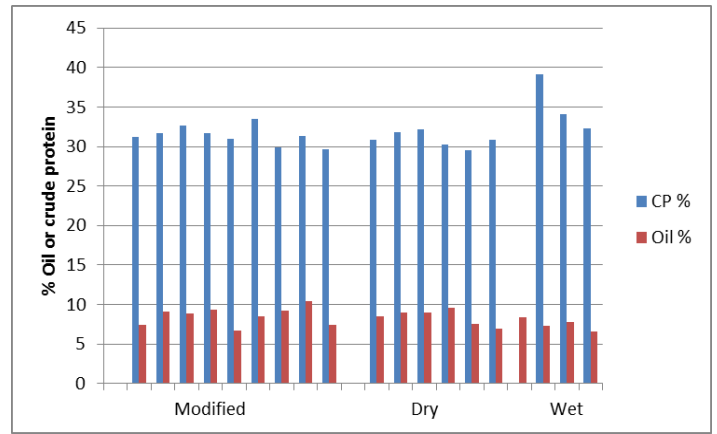


Figure 7. Protein % and oil % of analyzed samples (dry matter basis)